

# PATENT ABSTRACTS OF JAPAN

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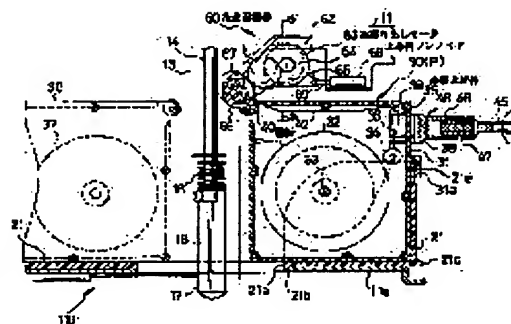
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## (54) EMBROIDERY SEWING MACHINE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To reduce the size and cost of an embroidery sewing machine for sewing embroidery patterns in color and to automate embroidering by reducing the size and weight of a needle thread cassette housing a needle thread so as to mount plural needle thread cassettes.

**SOLUTION:** Each needle thread cassette 30 is provided with a needle thread bobbin 32, a tension device 34 and a thread take-up body 35 pulling up a needle thread 42 to reduce the size and weight of the cassettes 30 to radially arrange on a cassette supporter 21 and is provided with a cassette switching mechanism rotate-driving the supporter 21, a thread take-up driving mechanism, a thread moving back/forth mechanism 60, a threading mechanism 110, a thread cutting mechanism, a worked cloth moving mechanism to move of the cassette 30 provided for embroidering to a supplying position and to fully automate the threading operation of the needle thread 42 extending from the cassette 30, thread exchanging operation during sewing and thread cutting operation at the time of finishing sewing to automatically sew color embroidery patterns.



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CLAIMS

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[Claim(s)]

[Claim 1] In the embroidery sewing machine equipped with the needle bar which has a sewing needle, the iron pot for \*\*\*\* prehension which collaborates with a sewing needle and forms a blind stitch, and the processing cloth migration means which carries out the migration drive of the processing cloth independently to the 2-way which intersects perpendicularly It has the cassette base material with which it is equipped with two or more needle-thread cassettes which held the needle thread of a color which is mutually different, and said two or more needle-thread cassettes free [ attachment and detachment ]. The embroidery sewing machine characterized by having the cassette change means which switches the location of a cassette base material so that one needle-thread cassette with which sewing of two or more needle-thread cassettes is presented may serve as a supply location which can supply a needle thread to a sewing needle.

[Claim 2] The embroidery sewing machine according to claim 1 characterized by preparing thread take-up \*\*\*\*\* which prepares thread take-up \*\*\*\* for pulling up the needle thread prolonged to the eye hole of a thread tension unit and a sewing needle to said each needle-thread cassette, and carries out a rotation drive from the outside of a needle-thread cassette by considering thread take-up \*\*\*\* of the needle-thread cassette which is in said supply location as vertical actuation of a sewing needle at the time of \*\*.

[Claim 3] It is the embroidery sewing machine according to claim 1 or 2 which said cassette base material is formed in a core at the level circular plate which has a needle-bar passage hole, and is characterized by arranging two or more needle-thread cassettes on a cassette base material at a radial.

[Claim 4] Said cassette change means is an embroidery sewing machine given in any 1 term of claims 1-3 characterized by including the cassette change driving means which carries out the rotation drive of the cassette base material.

[Claim 5] An embroidery sewing machine given in any 1 term of claims 1-4 characterized by having formed the idling roller in the needle-thread outlet of each of said needle-thread cassette, having collaborated with the idling roller of the needle-thread cassette in a supply location, having let out the needle thread, and establishing the yarn attitude means which can be rewound.

[Claim 6] An embroidery sewing machine given in any 1 term of claims 1-5 characterized by establishing the threader device which lets the needle thread prolonged from the needle-thread cassette of said supply location pass to the eye hole of a sewing needle.

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[Translation done.]

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention prepares two or more needle-thread cassettes which hold especially a needle thread for every thread color about the embroidery sewing machine which gives various kinds of color embroidery to a processing cloth using the needle thread of two or more colors, and relates to what was made to carry out embroidery sewing of the thread color of a needle thread with the change by moving the specific needle-thread cassette which supplies a needle thread to a predetermined supply location.

[0002]

[Description of the Prior Art] Practical use is presented with the multi-needle type embroidery sewing machine which supported the needle-bar case equipped with two or more needle bars possible [ horizontal migration ] in the front end section of the sewing-machine arm section in order to carry out sewing of the colorful embroidery pattern which consists of two or more colors conventionally. for example, to JP,6-304368,A By supporting the needle-bar case which supports two or more needle bars possible [ right-and-left directional movement ] in the front end section of the arm section, and making a left or the method of the right move a needle-bar case to it by the motor for a needle-bar change in a multi-needle type embroidery sewing machine The needle bar which was prepared in the needle-bar case and to construct [ two or more ], 1 set of needle bar in a balance, and a balance are connected with a drive system, and the multi-needle sewing machine embroidered with the needle thread supplied to the needle bar is proposed.

[0003] Moreover, while preparing the yarn source of supply which twisted the needle thread at JP,63-30037,B in the cassette which has one pair of legs, when forming two or more apertures and openings in a cassette case and changing the class and thread color of yarn into it, the cassette type yarn feeder for sewing machines with which the cassette adaptation room formed in the arm section of the body of a sewing machine was equipped removable is proposed. Furthermore, when attaching in the side face of the body of a sewing machine the cartridge which built into JP,7-24173,A the spool which twisted the embroidery thread for sewing, the yarn tone slave, the \*\*\*\*\* electrode holder, the sewing needle, the cartridge electrode holder, etc., even if the height location of a balance is which location, it can attach easily, and the cartridge of the sewing machine which could be made to carry out sewing immediately is indicated only by equipping the body of a sewing machine with a cartridge, without carrying out threader actuation.

[0004]

[Problem(s) to be Solved by the Invention] However, in a multi-needle sewing machine given in said JP,6-304368,A, since the drive system which is enlarged since it has the needle bar and balance to construct [ two or more ], and drives it enlarges a needle-bar case, the whole embroidery sewing machine enlarges it, and it has the problem of becoming disadvantageous in tooth space in cost again. Moreover, since only the yarn source of supply was contained to the cassette in the cassette type yarn feeder for sewing machines given in JP,63-30037,B, the effectiveness of cassetting is not so remarkable, and when changing a thread color on the occasion of carrying out sewing of the embroidery pattern of a color, since cassettes will be exchanged each time and a threader activity will be done further, it is inferior to operability. Furthermore, it is impossible to automate embroidery sewing including a yarn substitute.

[0005] Furthermore, since cartridges are exchanged for every yarn substitute at the time of embroidery sewing of a color while a cartridge is enlarged and becoming expensive in cost, since the cartridge lever, the sewing needle, etc. are built into said JP,7-24173,A in the cartridge in the cartridge of the sewing machine of a publication, it is impossible to automate embroidery sewing including a yarn substitute in addition to being inferior to operability. This invention is made in order to solve the above-mentioned trouble, and it aims the needle-thread cassette which holds a needle thread at a miniaturization and the miniaturization of an

embroidery sewing machine which lightweight-izes, enables two or more needle-thread cassette wearing, and carries out sewing of the embroidery pattern in a color and low-cost-izing, and attaining automation of embroidery sewing further.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the embroidery sewing machine of claim 1 The needle bar which has a sewing needle, and the iron pot for \*\*\*\* prehension which collaborates with a sewing needle and forms a blind stitch, Two or more needle-thread cassettes which are the embroidery sewing machines equipped with the processing cloth migration means which carries out the migration drive of the processing cloth independently to the 2-way which intersects perpendicularly, and held the needle thread of a mutually different color, It has the cassette base material with which it is equipped with two or more needle-thread cassettes free [ attachment and detachment ], and it has the cassette change means which switches the location of a cassette base material so that one needle-thread cassette with which sewing of two or more needle-thread cassettes is presented may serve as a supply location which can supply a needle thread to a sewing needle.

[0007] On the cassette base material, it is equipped with two or more needle-thread cassettes which held the needle thread of a color which is different in "red", "yellow", and mutual [ -- "it is green" -- ] free [ attachment and detachment ]. The location of the cassette base material is switched so that sewing of two or more needle-thread cassettes may be presented, for example, one needle-thread cassettes, such as red and yellow, may become a sewing needle with a cassette change means with the supply location which can supply a needle thread. Consequently, the needle thread of "red" and "yellow" is supplied to a sewing needle from the needle-thread cassette switched to the supply location, and a blind stitch is formed in a processing cloth of collaboration with a sewing needle and the iron pot for \*\*\*\* prehension.

[0008] Moreover, the embroidery sewing machine of claim 2 prepares thread take-up \*\*\*\*\* which prepares thread take-up \*\*\*\* for pulling up the needle thread prolonged to the eye hole of a thread tension unit and a sewing needle to said each needle-thread cassette, and carries out a rotation drive from the outside of a needle-thread cassette by considering thread take-up \*\*\*\* of the needle-thread cassette which is in a supply location as vertical actuation of a sewing needle at the time of \*\* in invention of claim 1.

[0009] In this case, when the needle thread held in the interior lets out in each needle-thread cassette on the occasion of embroidery sewing according to a \*\*\*\* loop formation being formed by the iron pot for \*\*\*\* prehension, resistance is added by the thread tension unit and stitch balancing thread tension is adjusted. On the other hand, on the occasion of the tightening of the formed \*\*\*\* loop formation, thread take-up \*\*\*\* of the needle-thread cassette in a supply location considers as vertical actuation of a sewing needle by external thread take-up \*\*\*\*\* at the time of \*\*, and since a rotation drive is carried out, the formed \*\*\*\* loop formation is tightened certainly. In addition, the same operation as claim 1 is done so.

[0010] Furthermore, said cassette base material is formed in the level circular plate with which the embroidery sewing machine of claim 3 has a needle-bar passage hole in a core in invention of claims 1 or 2, and two or more needle-thread cassettes are arranged on a cassette base material at a radial. In this case, since it is arranged on the cassette base material formed in the level circular plate at the radial, two or more needle-thread cassettes can arrange two or more needle-thread cassettes in a compact, moreover they rotate that cassette base material, only switch a location, and can arrange easily the specific needle-thread cassette with which sewing is presented in a supply location. In addition, the same operation as claims 1 or 2 is done so.

[0011] And the embroidery sewing machine of claim 4 includes the cassette change driving means to which said cassette change means carries out the rotation drive of the cassette base material in invention of any 1 term of claims 1-3 again. In this case, since a cassette change means includes a cassette change driving means, the rotation drive of the-cassette-base material can be carried out certainly and easily by that cassette change driving means. In addition, the same operation as any 1 term of claims 1-3 is done so.

[0012] Furthermore, in invention of any 1 term of claims 1-4, the embroidery sewing machine of claim 5 forms an idling roller in the needle-thread outlet of each of said needle-thread cassette, it collaborates with the idling roller of the needle-thread cassette in a supply location, lets out a needle thread, and establishes the yarn attitude means which can be rewound. In this case, when the needle-thread cassette with which the location of a cassette base material is switched and sewing is presented is moved to a supply location, A needle thread is rewound in order to extract a needle thread from an eye hole on the occasion of migration out of the supply location of a needle-thread cassette, while the idling roller formed in the needle-thread outlet of the needle-thread cassette of the supply location rotates with a yarn attitude means and a needle thread lets out on the occasion of the threader to the eye hole of a sewing needle. In addition, the same

operation as any 1 term of claims 1-4 is done so.

[0013] Moreover, the embroidery sewing machine of claim 6 establishes the threader device which lets the needle thread prolonged from the needle-thread cassette of said supply location pass to the eye hole of a sewing needle in invention of any 1 term of claims 1-5. In this case, whenever a needle-thread cassette moves to a supply location, the eye hole of a sewing needle lets automatically the needle thread prolonged from the needle-thread cassette of that supply location pass according to a threader device. In addition, the same operation as any 1 term of claims 1-5 is done so.

[0014]

[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained based on a drawing. This operation gestalt is a thing at the time of applying this invention for the embroidery pattern of the color which equips with eight needle-thread cassettes removable, and consists of two or more colors to the embroidery sewing machine in which sewing is possible. Eight needle-thread cassettes 30 with which it was equipped on the cassette base material 21 with this level embroidery sewing machine 1, The cassette change device 20 which switches the location of the cassette base material 21, Thread take-up \*\*\*\*\* 44 which performs the cobwebbing bundle of a needle thread 42, and the yarn attitude device 60 which sends out or rewinds the needle thread 42 from the needle-thread cassette 30 of a supply location, The needle-bar vertical-movement device 75 and the iron pot drive 85 which carries out the rotation drive of the level rotary pan (a water kettle is called hereafter) 92, Only by containing all drive systems, such as the processing cloth migration device 120 which carries out the migration drive of the processing cloth to embroider independently of the direction of X and the direction of Y which intersect perpendicularly, in the body case 2, and setting a processing cloth to an embroidery frame 121 It is made to carry out sewing of the embroidery pattern of a color to the processing cloth automatically.

[0015] As said body case 2 is shown in drawing 1 and drawing 2 , it is the configuration made to resemble facsimile apparatus and a printer, and the control-system hold room 5 in which the control system of a control box 12 etc. is held is formed in a part for the first portion of the body case 2, and the drive-system hold room 6 which holds drive systems, such as the needle-bar vertical-movement device 75 and the iron pot drive 85, in a part is formed the second half in which one step of the body case 2 became high. The opening 7 for setting a processing cloth to an embroidery frame 121 is continued and formed in an abbreviation full, the covering device material 3 which fixed the handle 4 is pivoted in the upper part of the drive-system hold room 6 possible [ closing motion ] by the upper part of said control-system hold room 5, and the broad liquid crystal display 10 is attached in the front end part of the covering device material 3 in it.

[0016] Moreover, as shown in drawing 1 , the control panel 9 which formed two or more touch type keys which contain in the boundary parts of the control-system hold room 5 and the drive-system hold room 6 the function key for the communication link which transmits and receives the reset key which resets these drive systems, and embroidery data, the sewing initiation key which starts embroidery sewing, various kinds of display lamps, etc. is formed. Furthermore, the opening 8 for rotating the iron pot unit 86 mentioned later, and pulling out outside is formed in the right lateral of the body case 2. Next, the needle-thread cassette 30 is explained to be the cassette change device 20 in which the cassette base material 21 equipped with two or more needle-thread cassettes 30 is rotated based on drawing 1 - drawing 7 .

[0017] As shown in drawing 2 , the support frame 11 attached in the body case 2 by two or more plinth 2a is arranged in the interior of said drive-system hold room 6. To level retaining-wall section 11a which is a part of the support frame 11, and clipped the core circularly As shown in drawing 3 and drawing 4 , the cassette base material 21 which consists of a level circular plate in which needle-bar passage hole 21a was formed to the core is laid. And the cassette base material 21 is supported by retaining-wall section 11a pivotable through engagement to these engagement edge 21b and retaining-wall section 11a because engagement edge 21b to which the inner circumference edge of the cassette base material 21 extended caudad engages with the inner circumference edge of retaining-wall section 11a.

[0018] By the way, as shown in drawing 4 , drawing 5 , and drawing 7 , gear 21c was formed and the drive gear 25 of the cassette change motor 24 has geared through two middle gears 22 and 23 to this gear 21c at the periphery section of the cassette base material 21. Namely, the cassette base material 21 rotates in the direction of a clockwise rotation, or the direction of a counterclockwise rotation in plane view through the middle gears 22 and 23 by normal-rotation-driving or inversion driving the cassette change motor 24. Here, on the cassette base material 21, eight cassette holder 21d is arranged for every predetermined include angle at the radial, each cassette holder 21d is equipped with the needle-thread cassette 30 free [ attachment and detachment ], and the needle-thread cassette 30 is explained below.

[0019] As shown in drawing 5 and drawing 7 , the needle-thread cassette 30 carries out the bis-stop of the

right-and-left both-sides side of the rectangle frame case 31 made of synthetic resin which sets width of face to about 10mm by one pair of side attachment walls 29. And when attaching the needle-thread cassette 30 in the cassette base material 21, it is equipped by depressing below, mating the needle-thread cassette 30 in cassette holder 21d, and making engagement pawl 31a formed in the needle-thread cassette 30 engage with cassette holder 21d engagement hook section 21e.

[0020] The needle-thread bobbin 32 which twisted the "red" needle thread 42 as shown in drawing 5 and drawing 6 is supported pivotably pivotable with the pivotable support shaft 33 by the interior of the needle-thread cassette 30, the thread tension unit 34 which consists of one pair of stitch-balancing-thread-tension pans 34a and 34b by which elastic energization was carried out by the compression spring besides illustration is formed in it, and approximately cylindrical thread take-up \*\*\*\*\* 35 is further supported pivotably by the side face of the rectangle frame case 31 pivotable. While the hook pawl 36 which hooks a needle thread 42 is formed, the flange 37 is formed in one place of the periphery section of this thread take-up \*\*\*\*\* 35 so that a needle thread 42 may not separate.

[0021] Furthermore, two or more engagement pawls 38 which engage with the engagement pawl 48 of the engagement member 46 of thread take-up \*\*\*\*\* 44 mentioned later possible [ engaging and releasing ] are formed in the part projected outside from the rectangle frame case 31 of thread take-up \*\*\*\*\* 35. And after hooking the needle thread 42 prolonged from the needle-thread bobbin 32 via the cylinder part of thread take-up \*\*\*\*\* 35 and hooking it on a pawl 36 through a thread tension unit 34, it lets it out outside via the idling roller 40 supported pivotably by the outlet section pivotable via the guide idler 39.

[0022] Next, thread take-up \*\*\*\*\* (it is equivalent to thread take-up \*\*\*\*\*) 44 which drives thread take-up \*\*\*\*\* 35 is explained with reference to drawing 2 - drawing 6. As shown in drawing 4 and drawing 5, it is made to make a location most back into a supply location among eight needle-thread cassettes 30 with which the cassette base material 21 is equipped. The back end section of the driving shaft 45 prolonged at a cross direction on the support frame 11 behind [ of being located in the supply location ] the needle-thread cassette 30 (P) is supported pivotably pivotable. The front end section of the driving shaft 45 is formed in a minor diameter, and the cylinder-like engagement member 46 is supported movable approximately, and a stop is escaped and carried out, and elastic energization is ahead carried out with the coil spring 47. Two or more engagement pawls 48 of the front sense are formed in the engagement member 46.

[0023] Furthermore, as shown in drawing 4, in the section near the back end of a driving shaft 45, the change member 49 of the shape of a cylinder of having formed annular engagement slot 49a fixes, and the point of the actuation pin 52 attached in the plunger 51 of the solenoid 50 for connection is engaging with this engagement slot 49a at it. On the other hand, the \*\*\*\*\* motor 53 fixed to the driving shaft 45 up side, and the drive gear 54 fixed to the \*\*\*\*\* motor 53 has geared on the follower gear 55 fixed to the back end section of a driving shaft 45. That is, when the solenoid 50 for connection operates and a plunger 51 projects back, a driving shaft 45 moves back, and both [ these ] the engagement pawls 38 and 48 estrange mutually.

[0024] By the way, when actuation of the solenoid 50 for connection is suspended, a driving shaft 45 moves ahead with the energization spring besides illustration, and both the engagement pawls 38 and 48 are engaged. At this time, elastic energization of the engagement pawl 48 was carried out with the coil spring 47 to the direction of the engagement pawl 38 of another side, and both the engagement pawls 38 and 48 have geared certainly. And the \*\*\*\*\* motor 53 drives only predetermined time at the time of the \*\*\*\*\* timing from which the \*\*\*\* loop formation formed with the water kettle 92 mentioned later separated from the inner kettle 97, predetermined takes up, thread take-up \*\*\*\*\* 35 rotates in a direction (the direction of arrow-head Q of drawing 6), and the needle thread 42 prolonged to eye hole 15a of a sewing needle 15 can pull up by a needle thread 42 being drawn in the needle-thread cassette 30 by the hook pawl 36.

[0025] Next, the yarn attitude device 60 which sends out or rewinds the needle thread 42 of the needle-thread cassette 30 located in said supply location is explained based on drawing 5. the rocking plate 61 arranged immediately in the needle-thread cassette 30 bottom of a supply location -- said support frame 11 - - the pivotable support pin 62 -- the upper and lower sides -- it is supported pivotably rockable and the driving roller 67 connected with the yarn delivery motor 63, two middle gears 65 and 66 which gear on the drive gear 64 of the yarn delivery motor 63, and the middle gear 66 of those in the shape of the same axle is supported pivotably by the rocking plate 61 free [ rotation ]. Moreover, the rocking plate 61 is connected with the plunger 69 of the solenoid 68 for needle threads attached in the support frame 11.

[0026] That is, the solenoid 68 for needle threads operates, the yarn delivery location which shows the rocking plate 61 as a continuous line for carrying out the \*\* ON drive of the plunger 69, and cooking at



drawing 5 rocks, and press contact of a driving roller 67 and the idling roller 40 is carried out. Since a driving roller 67 rotates through the drive gear 64 and both the middle gears 65 and 66 at this time when the yarn delivery motor 63 drives, it rotates to coincidence, and the needle thread 42 of the needle-thread bobbin 32 lets out through a thread tension unit 34 or thread take-up \*\*\*\* 35, or the idling roller 40 is rewound in the needle-thread cassette 30. On the other hand, when actuation of the solenoid 68 for needle threads is suspended, with the energization spring besides illustration, the rocking plate 61 goes up to the upper position in readiness shown according to a two-dot chain line, and a driving roller 67 separates from the idling roller 40.

[0027] By the way, as shown in drawing 2 - drawing 5, the needle bar 14 is supported possible [ vertical movement ] by the center section surrounded by eight needle-thread cassettes 30 arranged in the radial with the needle-bar base material 13 of a side view abbreviation U shape prolonged in the vertical direction, and the needle-bar vertical-movement device 75 in which the vertical drive of the needle bar 14 is carried out next is explained. As shown in drawing 4, the main shaft 76 of the cross-direction sense is arranged in said driving shaft 45 bottom, and the main shaft 76 is supported pivotably by the support frame 11 pivotable by two or more places. The end section of a crank 77 fixes in the front end section of a main shaft 76, a needle bar crank 78 is connected with the other end of the crank 77 free [ rotation ] through a crank pin, and the lower limit section of a needle bar crank 78 is connected with the inside step of a needle bar 14 through the needle bar connecting bracket 79.

[0028] On the other hand, the sewing-machine motor 80 was attached in the support frame 11 of the section near the back end of a main shaft 76, and the bevel gear 81 fixed to the driving shaft of the sewing-machine motor 80 mesh with the bevel gear 82 which fixed on the main shaft 76 on it. When the sewing-machine motor 80 drives on the occasion of embroidery sewing initiation, a main shaft 76 drives to a predetermined hand of cut, and the sewing needle 15 attached in the lower limit of a needle bar 14 at that a needle bar 14 moves up and down through a needle bar crank 78 or a needle bar connecting bracket 79 and coincidence also moves up and down. Here, when it is supported possible [ vertical movement of the upper limit section of the presser-foot guide peg 17 ], and elastic energization is caudad carried out by the compression spring 18 and a needle bar 14 descends to the lower limit section of a needle bar 14, a processing cloth is pressed down according to the spring force of a compression spring 18, and is pressed down on foot 17.

[0029] Next, the iron pot drive 85 formed in the needle-bar 14 bottom is explained based on drawing 2 - drawing 4, and drawing 7. It continues ahead from said cassette base material 21 bottom, and the abbreviation box-like iron pot unit 86 is arranged. The front end section of the support plate 87 of the iron pot unit 86 by the pivotable support pin 88 Cover the actuated position located in the cassette base material 21 bottom, and the rotation location rotated to the method of right-hand side of the body case 2, and it is supported pivotably possible [ a location change ]. When the iron pot unit 86 is switched to an actuated position, it is held by the back end section being supported by the support frame 11 in a predetermined height location.

[0030] The top cover of said iron pot unit 86 is constituted as a throat plate 89, and is supported by the unit case 90 possible [ a slide in the die-length direction ]. On the other hand, the cylinder-like iron pot receipt case 91 where the upper part was opened wide is attached in a part in the abbreviation second half of the interior of the iron pot unit 86, and the water kettle (level rotary pan) 92 is contained inside the iron pot receipt case 91. That is, outside the water kettle 92, an iron pot 93 is supported pivotably by the iron pot receipt case 91 pivotable through the rotary hook shaft 94 of the vertical sense, and the iron pot drive gear 95 is being fixed to the lower limit section of the rotary hook shaft 94.

[0031] On the other hand, the iron pot drive motor 96 is attached in the support frame 11 of the iron pot unit 86 bottom at the time of an actuated position, and engagement of the drive gear which fixed to the driving shaft of the iron pot drive motor 96 has become possible from a left to the iron pot drive gear 95 at it. and the inner kettle 97 by which niting was carried out -- the outside iron pot 93 -- relativity -- it holds pivotable and the interior of the inner kettle 97 is equipped with the bobbin-thread bobbin 98 which twisted the bobbin thread. Here, since the water kettle 92 is exposed by inserting a finger in drawing 3 from opening 8 as the chain line shows, pulling out the back end section of the iron pot unit 86, and making a change and a throat plate 89 slide to a rotation location when exchanging the bobbin-thread bobbin 98, the bobbin-thread bobbin 98 can be removed.

[0032] Next, the yarn cutting machine style 100 which cuts a needle thread 42 and a bobbin thread is explained based on drawing 4 and drawing 7 at the time of sewing termination. As shown in said throat-plate 89 bottom at drawing 7, the movable cutting edge 101 is supported pivotably rockable by the pin 102, and the stationary knife 103 which carries out yarn cutting by the movable cutting edge 101 and

collaboration is also being fixed to the throat-plate 89 bottom. On the other hand, the plunger 105 of the thread-cutter solenoid 104 by which pin association was carried out is connected with the throat plate 89 at the movable cutting edge 101. And since vertical both the yarn that has inserted in pinholing 89a of a throat plate 89 is engaging with the movable cutting edge 101 when carrying out \*\* ON after a plunger 105 marches out because the thread-cutter solenoid 104 drives only predetermined time at the time of thread-cutter timing, these vertical both yarn is cut by coincidence by the movable cutting edge 101 and the stationary knife 103.

[0033] Next, the needle thread 42 prolonged from the needle-thread cassette 30 located in a supply location is explained based on drawing 5 and drawing 8 about the threader device 110 which it lets pass to eye hole 15a of a sewing needle 15. However, the direction of eye hole 15a is made into the cross-direction sense, i.e., the direction sense of needle-thread cassette 30(P) of a supply location. In the inferior surface of tongue of retaining-wall section 11a corresponding to the needle-thread cassette 30 which counters the needle-thread cassette 30 of a supply location (P), it has fixed in the end face section in the condition that the fixture [ which makes a cross section the shape of a rectangle frame ] attachment component 111 which is flat and has predetermined die length turns to a sewing needle 15. Here, the front end of the fixture attachment component 111 is located near the sewing needle 15.

[0034] The threader implement 112 by which crookedness formation was carried out so that it might consist of thin elastic material and the amount of point might become an abbreviation rhombus is restrained by configuration which pushed and extended the rhombus, and is drawn and held in the interior of the fixture attachment component 111. On the other hand, the back end section of the threader implement 112 is connected with the plunger 114 of the threader solenoid 113 which fixed on the inferior surface of tongue of the cassette base material 21. Since the advance drive of the threader solenoid 113 is carried out, the plunger 114 marches out on the occasion of a threader and the threader implement 112 is ahead extruded rather than the fixture attachment component 111 one by one from the point, after inserting in eye hole 15a of a sewing needle 15, constraint of configuration maintenance will be canceled, and as shown in drawing 8, it will open in the shape of an abbreviation rhombus. At this time, a needle thread 42 lets out only the specified quantity according to the yarn attitude device 60, and the margin-of-string section of a needle thread 42 trespasses upon the interior of the rhombus of that threader implement 112.

[0035] Then, when the point of the threader implement 112 escapes from eye hole 15a when the \*\* ON drive of the threader solenoid 113 is carried out and a plunger 114 carries out \*\* ON, and holding in the fixture attachment component 111, it can let a needle thread 42 pass to eye hole 15a. Next, a processing cloth is explained based on drawing 1, drawing 3, drawing 4, and drawing 9 about the processing cloth migration device 120 which carries out a migration drive. As shown in drawing 3, between the cassette base material 21 and the iron pot unit 86, the embroidery frame 121 equipped with the processing cloth with which embroidery is presented was arranged, and the supporter material 122 of the shape of a cylinder of the cross-direction sense has fixed on right-and-left both sides of the embroidery frame 121, respectively.

[0036] The embroidery frame 121 is moved in the direction of X (longitudinal direction) by the direction drive 135 of X while being moved in the direction (cross direction) of Y by the direction drive 125 of Y, as shown in drawing 9. First, if the direction drive 125 of Y is explained, the guide shaft 126 prolonged in a cross direction is arranged in the right-and-left both-ends side of the body case 2, the Y carriage 127 is supported by each guide shaft 126 movable approximately, respectively, and both [ these ] Y carriage 127 is connected with it in one by the connecting plate 128.

[0037] Two pulleys 129,130 are supported pivotable with the horizontal axis of the longitudinal-direction sense approximately, both [ these ] the pulleys 129,130 are covered, the left-hand side guide shaft 126 bottom is built over a timing belt 131, the pulley 130 on the backside is driven with the Y-axis drive motor 132, and the end section of a timing belt 131 is connected with the Y carriage 127. If the direction drive 135 of X is explained, the right-and-left both ends of the guide shaft 137 of the longitudinal-direction sense are fixed to the extended support plate 136 back prolonged in one from said Y carriage 127, and the X carriage 138 is supported by the guide shaft 137 possible [ left right translation ].

[0038] Furthermore, the pulley 139,140 of two right and left is supported pivotable at the circumference of the horizontal axis of the cross-direction sense, both [ these ] the pulleys 139,140 are covered, the guide shaft 137 bottom is built over a timing belt 141, and the left-hand side pulley 139 is driven with the X-axis drive motor 142 (refer to drawing 10). An embroidery frame 121 is connected with the X carriage 138 by the maintenance frame 143 of a plane view abbreviation U shape which has maintenance shaft of one pair of right and left 143a fixing, and making the front end section of said X carriage 138 correspond to the supporter material 122 of the shape of a cylinder of one pair of right and left of an embroidery frame 121,



respectively, and on the other hand, making these 1 pairs of maintenance shafts 143a insert in it. [0039] Here, while the embroidery frame 121 is certainly held according to the lock device besides illustration at 1 pair of maintenance shafts 143a, it can remove an embroidery frame 121 from maintenance shaft 143a easily by canceling the lock device manually. Although the embroidery frame 121 is not illustrated in order to equip with a processing cloth, it consists of an outer frame and a seating rim. While an embroidery frame 121 is moved in the direction of Y through a timing belt 131 or the Y carriage 127 by this because the Y-axis drive motor 132 drives, an embroidery frame 121 is moved in the direction of X through a timing belt 141 or the X carriage 138 because the X-axis drive motor 142 drives. And as shown in drawing 1 (the chain line shows to drawing 9 like), when an embroidery frame 121 moves to the opening 7 of the control-system hold room 5 top, anchoring or removal of a processing cloth is attained.

[0040] Next, the control system of the embroidery sewing machine 1 established in said control box 12 is briefly explained based on drawing 10. The microcomputer 151 with which a control unit 150 consists of CPU152, ROM153 and RAM154, a DMA (Direct Memory Access) controller 155, etc., It consists of a drive circuit 156, an input/output interface (illustration abbreviation), etc. A control panel 9, The cassette location pilot switch 157 which detects that the needle-thread cassette 30 of a specific color (for example, "red") was located in the supply location, Various kinds of signals are inputted from the 1st rotary encoder 158 prepared in the sewing-machine motor 80, the 2nd rotary encoder 159 prepared in the iron pot drive motor 96, the main shaft zero sensor 160, the rotary hook shaft zero sensor 161, etc.

[0041] on the other hand -- a control unit -- 150 -- from -- a drive -- a circuit -- 156 -- minding -- a sewing machine -- a motor -- 80 -- an iron pot -- a drive motor -- 96 -- a grade -- various kinds -- a motor -- 53 -- 24 -- 63,142,132 -- connection -- \*\* -- a solenoid -- 50 -- a grade -- various kinds -- a solenoid -- 104 -- 113 -- 68 -- a liquid crystal display (LCD) -- ten -- a sake -- a display controller -- (-- DC --) -- 162 -- a driving signal -- a control signal -- outputting -- having . By the way, the data for embroidery sewing are supplied from electronic equipment, such as an external personal computer, through the communication interface which has not carried out illustration.

[0042] Next, actuation of the embroidery sewing machine 1 constituted in this way is explained. First, as shown in drawing 2, the covering device material 3 is opened with a handle 4. And since the thread color of "red", "blue", "yellow", etc., etc. is specified as each cassette holder 21d of the cassette base material 21, respectively as shown in drawing 7, cassette holder 21d of the same color is equipped with the needle-thread cassette 30 which has needle threads, such as these "red" and "blue." At this time, as shown in drawing 5, it lets out the needle thread 42 of each needle-thread cassette 30 by predetermined die length from the idling roller 40. Then, the covering device material 3 is closed.

[0043] At this time, the location of the cassette base material 21 is switched so that the needle-thread cassette 30 of initialization processing, i.e., the 1st "red", may serve as [ the cassette base material 21 ] a supply location by the cassette change motor 24. Furthermore, since it moves to the opening 7 of the control-system hold room 5 top as an embroidery frame 121 shows drawing 1 by the drive of the Y-axis drive motor 132, a processing cloth is attached in the embroidery frame 121. And based on the thread color data contained in the data, when the sewing initiation key of a control panel 9 is operated, the cassette base material 21 rotates so that the needle-thread cassette 30 of the thread color may be located in a supply location. Then, actuation of the solenoid 50 for connection is suspended and both the engagement pawls 38 and 48 are engaged.

[0044] Next, since the threader solenoid 113 drives and the threader implement 112 is extruded ahead, after inserting in eye hole 15a of a sewing needle 15, it opens in the shape of an abbreviation rhombus. Next, since the needle thread 42 of the needle-thread bobbin 32 lets out as the solenoid 68 for needle threads operates and it is shown in drawing 8 by the yarn delivery motor 63 driving where press contact of a driving roller 67 and the idling roller 40 is-carried-out, the margin-of-string section of the needle thread 42 which it let out trespasses upon the interior of the threader implement 112 opened in the shape of [ the ] a rhombus from the upper part.

[0045] Then, the \*\* ON drive of the threader solenoid 113 is carried out, and when the point of the threader implement 112 escapes from eye hole 15a and is held in the fixture attachment component 111, it can let a needle thread 42 pass to eye hole 15a. Here, when the edge of a needle thread 42 has not escaped from the threader implement 112, the edge of a needle thread 42 can be certainly extracted from the threader implement 112 by raising a sewing needle 15 by the drive of the sewing-machine motor 80. Next, it is moved to the predetermined sewing starting position which the Y-axis drive motor 132 drives and an embroidery frame 121 shows to drawing 4 by actuation halt of the solenoid 68 for needle threads while a driving roller 67 separates from the idling roller 40.

[0046] And when the preparation for sewing initiation was completed, the sewing-machine motor 80, the iron pot drive motor 96 and also the X-axis drive motor 142, and the Y-axis drive motor 132 drive, and embroidery sewing is started based on sewing data. While driving based on the pulse signal from each rotary encoder 158,159 at this time so that the sewing-machine motor 80 and the iron pot drive motor 96 may synchronize, it considers as vertical movement of a sewing needle 15 at the time of \*\*, and it drives so that these motors 53,142,132 may synchronize. That is, when it is the \*\*\*\*\* timing to which a sewing needle 15 goes up, predetermined takes [ thread take-up \*\*\*\* 35 ] up by the \*\*\*\*\* motor 53, it rotates in a direction, and the needle thread 42 prolonged to eye hole 15a of a sewing needle 15 can pull up.

[0047] by the way, at the time of the yarn substitute in the middle of sewing While the drive of each motors 80, 96, and 53,142,132 is stopped A needle thread 42 should be rewound by the yarn attitude device 60, and lengthen and blunder from eye hole 15a of a sewing needle 15. After the yarn attitude device 60 evacuates up, the needle-thread cassette 30 which has the needle thread 42 of the color used for a degree according to the cassette change device 20 is switched to a supply location, and after the threader of the needle thread 42 which it let out is performed, sewing is resumed like the following. And when embroidery sewing is completed, the both-way drive of the movable cutting edge 101 is carried out by the drive of the thread-cutter solenoid 104, and the needle thread 42 and bobbin thread which have inserted in pinholing 89a of a throat plate 89 are cut by coincidence.

[0048] Here, the cassette change means of this invention consists of a cassette base material 21, a cassette change device 20, its control system, etc., thread take-up \*\*\*\*\* consists of thread take-up \*\*\*\*\* 44, its control system, etc., and the yarn attitude means consists of a yarn attitude device 60, its control system, etc. Thus, it sets to the embroidery sewing machine 1 equipped with the needle bar 14 which has a sewing needle 15, the water kettle 92 which collaborates with a sewing needle 15 and forms a blind stitch, and the processing cloth migration device 120 which carries out the migration drive of the processing cloth independently to the 2-way which intersects perpendicularly. Since it had two or more needle-thread cassettes 30 which held the needle thread 42 of a mutually different color, and the cassette change device 20 which switches the location of the cassette base material 21 with which it is equipped with two or more needle-thread cassettes 30 free [ attachment and detachment ] each needle-thread cassette 30 -- a miniaturization -- and it can lightweight-ize, embroidery sewing of a color can be performed easily, and a miniaturization and low-cost-izing of the embroidery sewing machine 1 can be attained further.

[0049] Thread take-up \*\*\*\* 35 for pulling up the needle thread 42 prolonged to said each needle-thread cassette 30 to eye hole 15a of a thread tension unit 34 and a sewing needle 15 is formed. Since thread take-up \*\*\*\*\* 44 which carries out a rotation drive from the outside of the needle-thread cassette 30 by considering thread take-up \*\*\*\* of the needle-thread cassette 30 in a supply location as vertical actuation of a sewing needle 15 at the time of \*\* was formed While the needle thread 42 by which stitch balancing thread tension was adjusted from each needle-thread cassette 30 on the occasion of embroidery sewing can be supplied to eye hole 15a, on the occasion of the tightening of a \*\*\*\* loop formation, it tightens certainly by the rotation drive of thread take-up \*\*\*\* 35, and can do.

[0050] Since it is formed in a core at the level circular plate which has needle-bar passage hole 21a and two or more needle-thread cassettes 30 are arranged on the cassette base material 21 at a radial, the cassette base material 21 can miniaturize and arrange two or more needle-thread cassettes 30, moreover it rotates the cassette base material 21, only switches a location, and can arrange easily the specific needle-thread cassette 30 with which sewing is presented in a supply location. Moreover, in the cassette change device 20, since the rotation drive of the cassette base material 21 is carried out by the cassette change motor 24, the rotation drive of the cassette base material 21 can be carried out certainly and easily.

[0051] Moreover, since the idling roller 40 was formed in the needle-thread outlet of each needle-thread cassette 30, it collaborated with the idling-roller 40 of the needle-thread cassette 30 in a supply location (P), it let out the needle thread 42 and the yarn attitude device 60 which can be rewound was established, a needle thread is rewound, when it can let out a needle thread 42 on the occasion of a threader and a needle thread 42 is extracted from eye hole 15a on the occasion of exchange of the needle-thread cassette 30. Furthermore, since the threader device 110 which lets the needle thread 42 prolonged from the needle-thread cassette 30 of a supply location (P) pass to eye hole 15a of a sewing needle 15 was established, whenever the needle-thread cassette 30 moves to a supply location, threader actuation of the needle thread 42 prolonged from the needle-thread cassette 30 of the supply location can be automated, and automation of embroidery sewing of a color is attained further.

[0052] As a modification gestalt of said operation gestalt, you may constitute as follows. 1) Straight-line-like cassette base material 21A is prepared, the cassette base material 21A is equipped with two or more

needle-thread cassettes 30 removable in the shape of juxtaposition, cassette base material 21A is supported movable with the guide shaft 170 and a screw shaft 171, and you may make it switch the location of cassette base material 21A as cassette change device 20A, by the drive of cassette change motor 24A connected with the screw shaft 171, as shown in drawing 11. 2) Based on an obvious technique, various modification can be added to an existing technique and this existing contractor about said operation gestalt. Furthermore, of course, this invention can be applied to various kinds of embroidery sewing machines, such as an embroidery sewing machine constituted so that a main shaft 76 and the water kettle 92 might be driven by the sewing-machine motor.

[0053]

[Effect of the Invention] In the embroidery sewing machine which was equipped with the needle bar which has a sewing needle, the iron pot for \*\*\*\* prehension which collaborates with a sewing needle and forms a blind stitch, and the processing cloth migration means which carries out the migration drive of the processing cloth independently to the 2-way which intersects perpendicularly according to invention of claim 1 as explained in full detail above Since it had two or more needle-thread cassettes which held the needle thread of a mutually different color, and the cassette change means which switches the location of the cassette base material with which it is equipped with two or more needle-thread cassettes free [ attachment and detachment ] each needle-thread cassette -- a miniaturization -- and it can lightweight-ize, embroidery sewing of a color can be performed easily, and a miniaturization and low-cost-izing of an embroidery sewing machine can be attained further.

[0054] Moreover, according to invention of claim 2, do so the same effectiveness as claim 1, but Thread take-up \*\*\*\* for pulling up the needle thread prolonged to the eye hole of a thread tension unit and a sewing needle to said each needle-thread cassette is prepared. Since thread take-up \*\*\*\*\* which carries out a rotation drive from the outside of a needle-thread cassette by considering thread take-up \*\*\*\* of the needle-thread cassette in a supply location as vertical actuation of a sewing needle at the time of \*\* was prepared While the needle thread by which stitch balancing thread tension was adjusted from each needle-thread cassette on the occasion of embroidery sewing can be supplied to the eye hole of a sewing needle, on the occasion of the tightening of a \*\*\*\* loop formation, it tightens certainly by the rotation drive of thread take-up \*\*\*\*, and can do.

[0055] Furthermore, according to invention of claim 3, do so the same effectiveness as claims 1 or 2, but Since said cassette base material is formed in a core at the level circular plate which has a needle-bar passage hole and two or more needle-thread cassettes are arranged on a cassette base material at a radial Two or more needle-thread cassettes can be miniaturized and arranged, and the specific needle-thread cassette with which sewing is presented can be easily arranged in a supply location only by rotating the cassette base material moreover and switching a location. And according to invention of claim 4, the same effectiveness as any 1 term of claims 1-3 is done so, but since said cassette change means includes the cassette change driving means which carries out the rotation drive of the cassette base material, it can carry out the rotation drive of the cassette base material certainly and easily by the cassette change driving means again.

[0056] Moreover, according to invention of claim 5, do so the same effectiveness as any 1 term of claims 1-4, but Since the idling roller was formed in the needle-thread outlet of each of said needle-thread cassette, it collaborated with the idling roller of the needle-thread cassette in a supply location, it let out the needle thread and the yarn attitude means which can be rewound was established A needle thread is rewound when it can let out a needle thread only about the needle-thread cassette moved to the supply location when carrying out a threader, and extracting a needle thread from an eye hole. Furthermore, although the same effectiveness as any 1 term of claims 1-5 was done so, since the threader device which lets the needle thread prolonged from the needle-thread cassette of said supply location pass to the eye hole of a sewing needle was established according to invention of claim 6, whenever a needle-thread cassette moves to a supply location, threader actuation of the needle thread prolonged from the needle-thread cassette of the supply location can be automated, and automation of embroidery sewing of a color is attained further.

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[Translation done.]

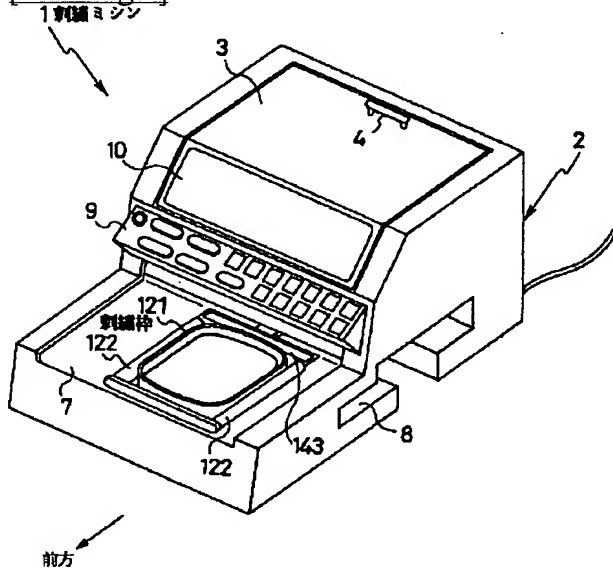
## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

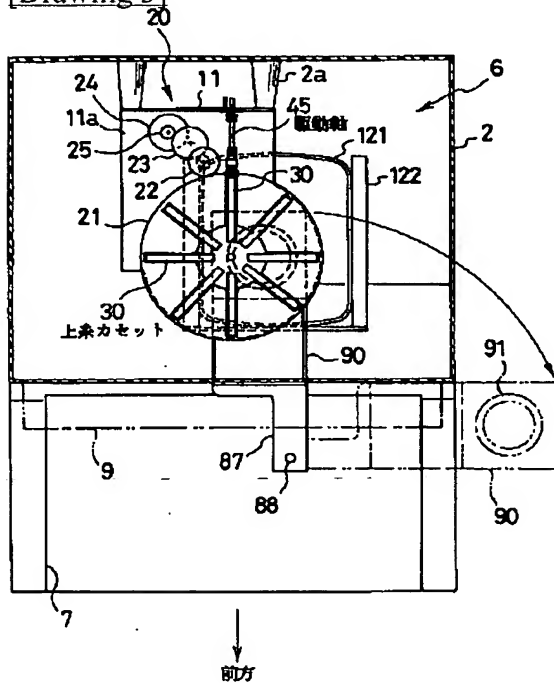
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DRAWINGS

[Drawing 1]

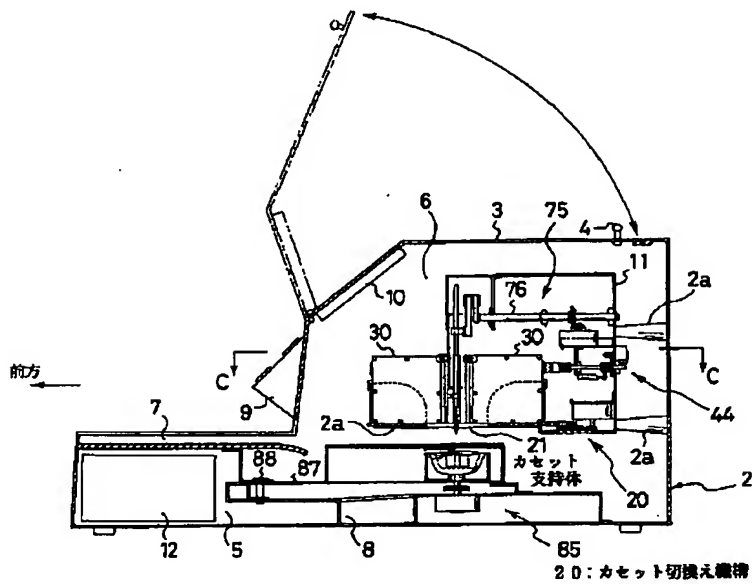


[Drawing 3]

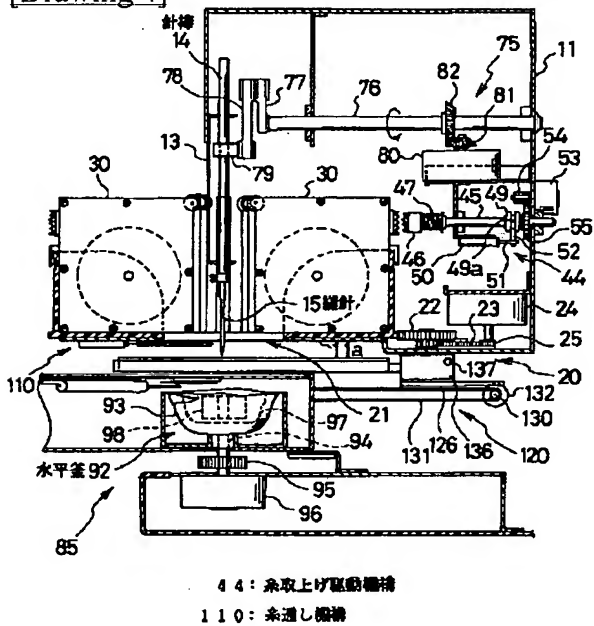


24 : カセット切換えモータ

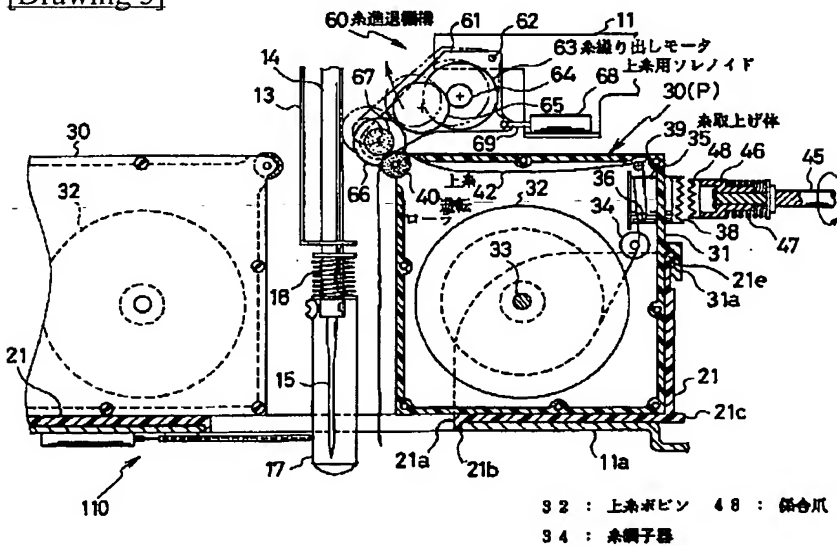
[Drawing 2]



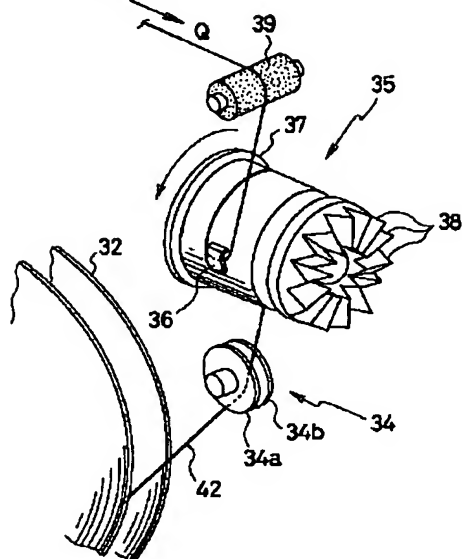
[Drawing 4]



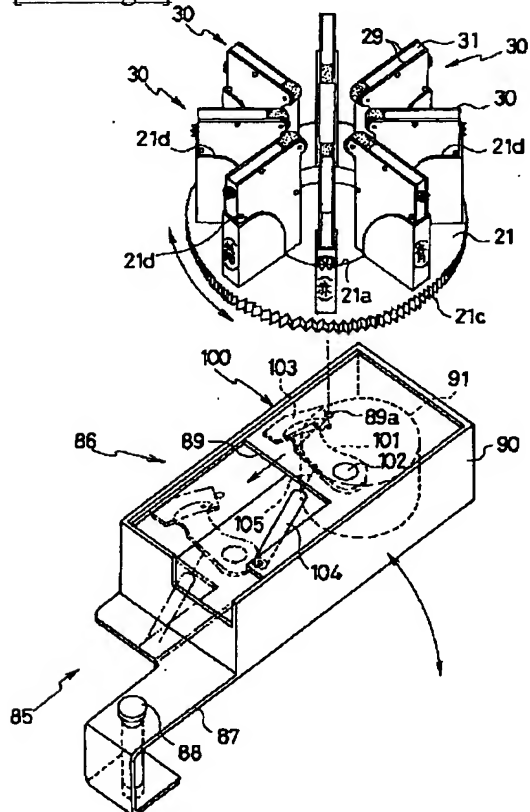
[Drawing 5]



[Drawing 6]

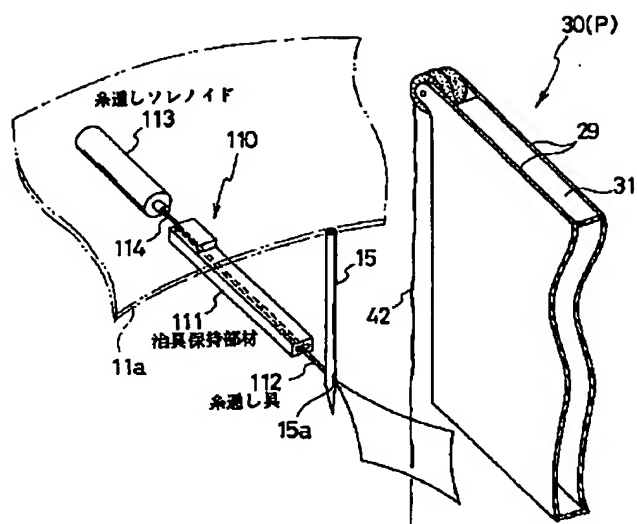


[Drawing 7]

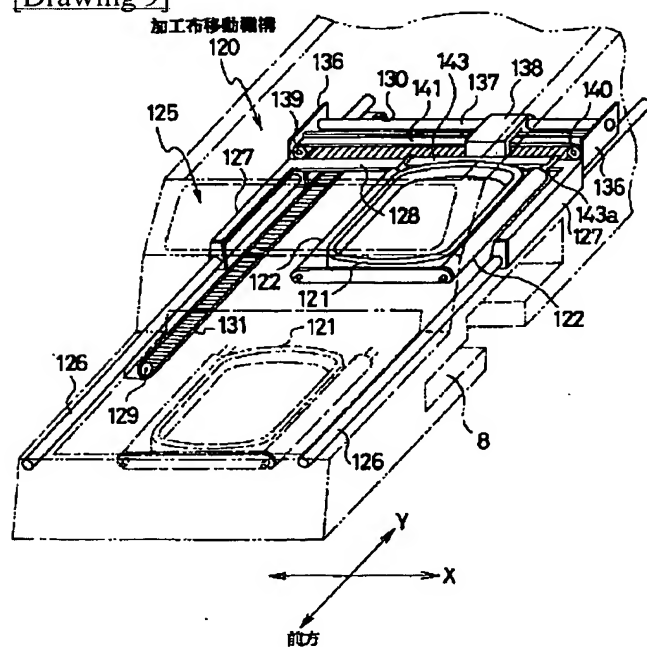


[Drawing 8]

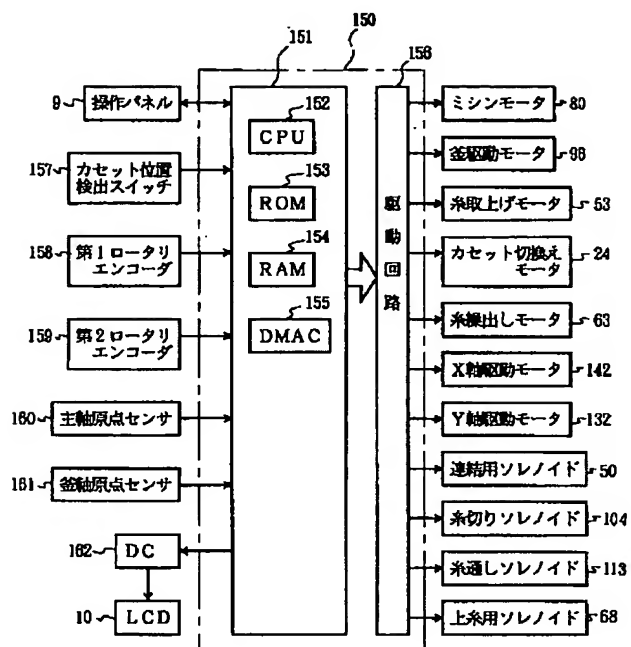




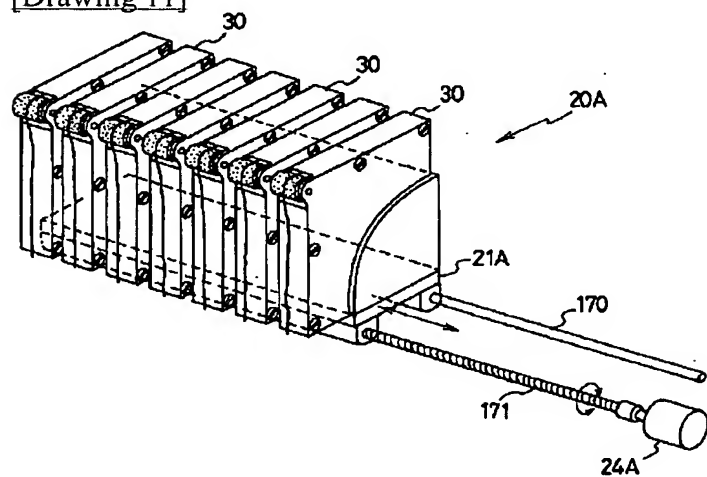
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]